

RADIOSCIENCE LABORATORY
STANFORD UNIVERSITY
Stanford, California

June 1965

THE STANFORD STUDY OF THE MARINER MARS OCCULTATION EXPERIMENT

Semi-Annual Report no. 1

For the Period 1 October 1964 - 31 March 1965

NASA Contract no. NGR-05-020-065
SEL Project no. 3216

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FACILITY FORM 602

N65-85727
(ACCESSION NUMBER)

3
(PAGES)

OL 63434
(NASA CR OR TMX OR AD NUMBER)

(THRU)
True
(CODE)

(CATEGORY)

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C.

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Research conducted under NASA contract NGR-05-020-065 involves analytic and computer simulated studies of methods to be used to analyze the data from the Mariner Mars occultation experiment.

THEORETICAL STUDIES

The Mariner IV spacecraft is scheduled to fly behind Mars on July 14, 1965. During immersion into and emersion from the occultation zone, the propagation paths of the communications links will pass through the atmosphere of the Red Planet. The perturbations imposed on the radio signal by the Martian atmosphere will provide a sensitive measure of the profile in height of the refractive index of the atmosphere. Measurements of amplitude and phase path will be used for two independent determinations of the refractive index profile. The measurements will be made by the Jet Propulsion Laboratory and the data analysis will be made jointly by that Laboratory and Stanford.

A study has been started of possible models for the atmosphere of Mars. This study is necessary in order to estimate the perturbations expected to the telemetry signal, and to help interpret the data when they become available. Current estimates show that the telemetry signal is affected both by the troposphere and the ionosphere. It is, therefore, expected that the occultation data will yield important new information on scale height and densities both in the lower atmosphere and in the ionosphere of Mars.

TRIPS

On 17 December 1964 Drs. V. R. Eshleman, B. B. Lusignan, and G. Fjeldbo attended a Mariner project meeting at the Jet Propulsion Laboratory (JPL) in Pasadena. A subsequent meeting held 19 February 1965 at JPL was also attended by these three men.

PUBLICATIONS

Two scientific reports were written during this period. One, "The bistatic radar-occultation method for the study of planetary atmospheres," was written by G. Fjeldbo and V. R. Eshleman and issued in February. The second, "The two-frequency, bistatic, radar-occultation method for the study of planetary ionospheres," was written by G. Fjeldbo, V. R. Eshleman, O. K. Garriott, and F. L. Smith, III and was issued in April. The Stanford Electronics Laboratories press published these reports. Both of these manuscripts have been accepted for publication in the Journal of Geophysical Research. The first one will appear in the July 1 issue and the second one will be published in the August 1 issue.